ALUMINUM

Project Fact Sheet

AUTOMOTIVE ALUMINUM SCRAP SORTING

BENEFITS

Successful completion of this project will offer many benefits:

- Recycling aluminum saves 95 percent of the energy needed to create new aluminum from ore. This translates to approximately 6.5 to 7 kilowatt hours of electricity saved for each pound of metal recycled. Potentially, a total of 53 trillion kilowatt hours could be saved, which is equivalent to 90 million barrels of oil.
- Alloy sorting will increase recycling and lead to environmental conservation. It is estimated that the first commercial sorting center will be able to analyze and sort 100 million pounds of aluminum per year.

APPLICATIONS

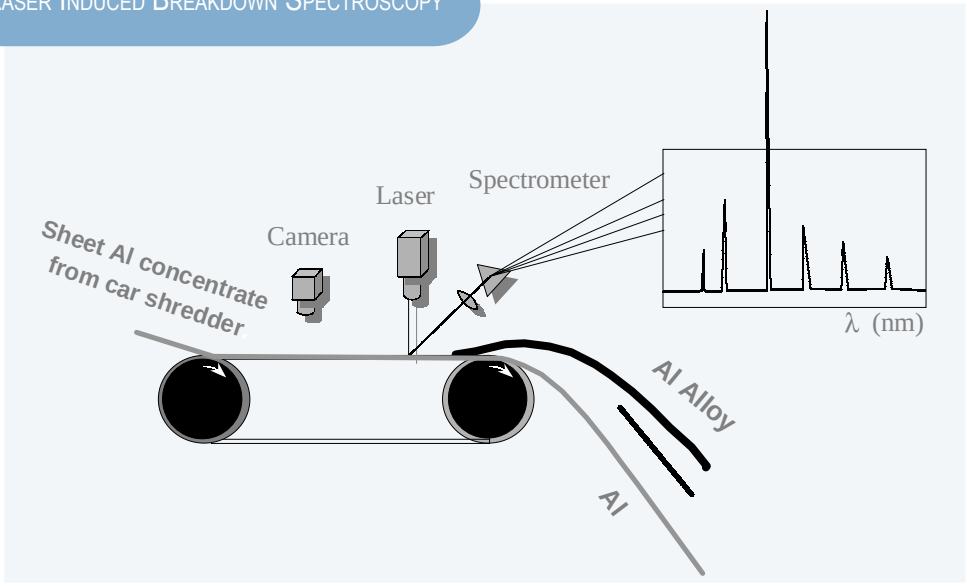
The market for alloy-segregated scrap is growing quickly and is likely to continue growing for a long time.

RECYCLING AND LASER SORTING OF SCRAP ALUMINUM BY ALLOY

Project partners will demonstrate an advanced process to improve automotive scrap sorting and recycling. This new recycling process has the potential to greatly increase the amount of high-value aluminum alloys that can be rapidly segregated from scrapped motor vehicles. Current recycling techniques only separate aluminum from other materials. The recovered mixed alloy scrap is appropriate for use in aluminum castings. However, the aluminum content of automobiles is increasing to a level where more aluminum scrap will be collected than can be recycled into cast components. This new process will separate cast aluminum from wrought, group alloy families, and differentiate between wrought alloys. As a result, alloy separations will recover aluminum that can be recycled into high value alloys. This enhanced recycling capability will improve energy and economic efficiency and ensure an affordable supply of aluminum for future markets.

Huron Valley Steel (HVS) Corporation has developed the new scrap sorting technologies and in this project, they are demonstrating the application of recycling aluminum scrap from aluminum-intensive vehicles. HVS is assessing the composition and material recovery from the sorting steps required to produce alloy-sorted aluminum from mixed-alloy scrap. A proprietary HVS technology is used for wrought-cast separation. Color sorting after tint etching of the wrought fraction is used for wrought alloy family grouping. Laser Induced Breakdown Spectroscopy (LIBS) is used for real-time, remote chemical analysis of each scrap particle allowing the sorting line to separate individual alloys. The average composition of the sorted product will be analyzed after melting to estimate the increased value and utility of alloy-sorted aluminum scrap.

LASER INDUCED BREAKDOWN SPECTROSCOPY



Alloy Sorting by Laser Induced Breakdown Spectroscopy (LIBS).

Project Description

Goals: The goals of this project are to:

1) demonstrate capability for separation of wrought alloy from cast aluminum alloys.

2) demonstrate existing and developed scrap-sorting capabilities using Color Sorting and Laser Induced Breakdown Spectroscopy (LIBS).

Progress and Milestones

Successful development of this technology will require the following steps:

Identification and Preparation of Scrap Types for Sorting Demonstration

- Determine the composition and volumes of alloy mixtures to be used for demonstration of alloy sorting.
- Compare available data on efficiency of wrought/cast separation.
- Conduct wrought/cast separation as necessary to prepare sufficient quantity of scrap for demonstration of alloy sorting.
- Prepare a spreadsheet model for estimating the scrap value through the recovery chain from shredded scrap to segregated alloy, including the impact of product compositions and recoveries at each step.
- Prepare bench-scale quantities of chemically etched alloys for preliminary color-sorting tests.

Demonstrate Color-Sorting and LIBS-Sorting Technology

- Select and prepare controlled mixtures of wrought-alloy scrap for sorting.
- Sort selected mixtures using color-sorting and LIBS techniques to determine the throughput and product recovery.
- Evaluate the effectiveness of alloy separation by hand sorting.
- Conduct 100 pound melt tests using products from color and LIBS sorting to confirm and compare efficiency of each technique and to test the LIBS concept of producing piece-by-piece batched compositions from mixed-alloy shredder scrap.
- Use the spreadsheet model to demonstrate if there is an increase in the value of the mixed-alloy aluminum scrap feed based on the projected premiums for the sorted-alloy products and resulting values of the residues.

Applicability of Sorting to Magnesium-Based Alloy Scrap

- Explore the applicability of sorting to magnesium-based alloy scrap and potentially other automotive scrap materials.

Decoating Requirements for Aluminum Scrap from Future Aluminum-Intensive Vehicles

- Evaluate sorting of quantities of shredded scrap using 100 pound melt tests and melting of selected larger volumes through available furnaces.

Commercialization Plan

Given recent trends pointing to the growing demand for alloy-sorted aluminum scrap, industrial commercialization of this technology is imminent.

Project Partners

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Alcan Aluminum Corporation
Cleveland, OH

Alcoa, Incorporated
Alcoa Center, PA

U.S. Department of Energy
Office of Transportation Technologies
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